

Call for applications – M2 internship

Lyon Institute of Nanotechnology <http://inl.cnrs.fr>
Ecole Centrale de Lyon, 36 av. Guy de Collongue,
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Hardware emulation of emerging technology on FPGA

Scientific context:

Computing architecture are facing new challenges today: the cost of reducing the basic component is becoming so important that new emerging technologies are making their way to be adopted in future processor architectures. Typically, these emerging technologies (such as silicon photonics, emerging non-volatile memories, vertical nano-wire transistors, etc.) involve in depth changes in the computing architecture to fully take advantage of the technology. This implies numerous tests, simulations, and demonstrators to find what will be the best application for the targeted technology but also understand its limitations.

However, it is not possible to manufacture a demonstrator for each test to be performed due to the manufacturing costs and doing only simulation-based design will take a very long time for complex heterogeneous systems. To counter these drawbacks, it is possible to use hardware emulation to speed up proof of concept demonstrator. An emulation platform can for example use a reconfigurable circuit (FPGA) in order to emulate the behavior of a complex system including emerging technologies will have. The advantage of this approach is that it becomes possible to perform a lot of tests for a reduced cost compared to manufacturing costs but also to reduce the time and computation power required compared to simulation.

Internship objectives:

This internship will **participate to the creation of a hardware emulation platform based on FPGA**. This platform will integrate a low power processor such as RISC-V but also modular emerging technologies structure. This internship principal objective is to **emulate ferroelectric field effect transistor and small computing structure** on the hardware emulation platform we are creating allowing the heterogeneous design team of the INL to integrate emerging technologies inside a processor. This Hardware emulation platform will be based on FPGA. The intern will also participate to the integration of the ferroelectric structure inside the low power processor and if needed to the implementation of the processor itself.

As a member of a research team working on related subject, PhD funding can be proposed at the end of the internship.

Mots-clefs:

Processor architecture, Non-volatile memories, Ferroelectric field effect transistor, Emerging technologies.

Profile:

You are a student in engineering school or in master in Electronic Engineering / Computer Science and have studied closely at least one of the following areas: analog/digital integrated circuit design, multi-disciplinary or system-level modelling. Knowledge of VHDL, Verilog, is a plus. Fluency in French is also a plus but is not mandatory.

About INL and the Heterogeneous system design research team:

INL is a 250-strong research institute based in Lyon, France, carrying out fundamental and applied research in electronics, semiconductor materials, photonics, and biotechnologies. The Heterogeneous Systems Design group is a leader in advanced nanoelectronic design, with research projects and collaborations at both national and European level. Recent highlights include the development of high-performance design strategies for complex 3D integrated circuits, reconfigurable computing using ambipolar devices and silicon photonic networks on chip.

Send CV and statement of purpose (in English or French) to

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